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SHORT CONTRIBUTION

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Near-repeat victimization of sex crimes and threat incidents against women and girls in Tokyo, Japan

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Abstract

Near-repeat victimization (NRV) is a phenomenon in which there is a greater likelihood for a subsequent crime to occur within close spatiotemporal proximity of the last occurrence of a similar crime. This study investigated the NRV of sex crimes and threat incidents against women and girls in Tokyo. An analysis using the Knox ratio showed significant near-repeat patterns of sex crimes and two types of threat incidents, with the exception of threat incidents with physical contact against girls. Additionally, the tendency of NRV was revealed as being stronger when the victims were girls.

Keywords: Near-repeat victimization, Sex crime, Threat incident, Women, Girls, Tokyo

Introduction

Near-repeat victimization (NRV) is a phenomenon wherein it is likelier for a subsequent crime to occur within close spatiotemporal proximity of a similar crime's last occurrence. NRV has consistently been verified since Townsley et al. (2003) first empirically confirmed it. Although earlier studies focused on the NRV of residential burglary, recent ones examined its relation to various crime types (Table 1).

NRV presumes that offender(s) repeatedly select a space–time region where more vulnerable criminal targets are concentrated or where a similar crime had been successfully perpetrated in the past, thus avoiding the risk of being arrested and obtaining the maximum benefits as an "optimal forager" (Johnson and Bowers 2004; Townsley et al. 2003).

Optimal foraging is applicable to impersonal sex-related crimes, and sex criminals tend to repeat sex crimes during short periods of time and in small areas, using rational and consistent methods to select their location (Beauregard Proulx and Rossmo 2005; Ceccato 2014; Hewitt and Beauregard 2014; Leclerc et al. 2016; Rebocho and Silva 2014; Tokyo Metropolitan Police Department [TMPD] 2017). Thus, NRV might be linked to sex-related crimes, and if so, crime prevention measures can be implemented more effectively by considering NRV, such as rapidly sharing information on sex-related crime cases with neighbors using email, SNS, or app push notifications (TMPD 2017).

However, previous studies have not verified NRV in sex-related crimes (Table 1), and this study aims to fill this gap.

Data and methods

Data

Data were obtained from the TMPD's official records on sex crimes (2011–2016) and "threat incidents" in public spaces (2014–2016). Public space in this study includes roads, parks, parking areas, and accessible areas at shopping centers or housing complexes.

The sex crime categories used in this research comprised rape and indecent assaults between unacquainted

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Table 1 Examples of previous studies on NRV of various crimes

Crime type	Articles
Residential burglary	Bowers and Johnson (2004, 2005); Chainey and da Silva (2016); de Melo et al. (2018); Glasner et al. (2018); Hino and Amemiya (2019); Hoppe and Gerell (2019); Johnson et al. (2007, 2009); Johnson and Bowers (2004); Moreto et al. (2014); Nobles et al. (2016); Piza and Carter (2018); Townsley et al. (2003); Wang and Liu (2017); Wu et al. (2015); Ye et al. (2015); Zhang et al. (2015)
Burglary	Chen et al. (2013)
Motor vehicle theft	Block and Fujita (2013); de Melo et al. (2018); Johnson et al. (2006); Lockwood (2012); Piza and Carter (2018); Youstin et al. (2011)
Theft from motor vehicle	Johnson et al. (2006, 2009)
Residential robbery	de Melo et al. (2018)
Commerce robbery	de Melo et al. (2018)
Street robbery	de Melo et al. (2018); Glasner and Leitner (2017); Youstin et al. (2011)
Armed street robbery	Haberman and Ratcliffe (2012)
Burglary, robbery, and assault	Grubesic and Mack (2008)
Assault with a gun	Wells et al. (2012)
Shooting	Ratcliffe and Rengert (2008); Sturup et al. (2018); Youstin et al. (2011); Zhang et al. (2015)
Arson	Grubb and Nobles (2016); Turchan et al. (2019)
Maritime piracy	Marchione and Johnson (2013)

Table 2 Frequency of analyzed data by types of crime/incident and women/girls

Types of crime/incident	Women	Girls	Source
Sex crime			
Rape and indecent assault	2681 (560; 2121)	431 (109; 322)	Official record (2011–2016)
Threat incident with physical contact			
Molestation	4222 (1088; 3134)	286 (63; 223)	Police response to call for police service (2014–2016)
Threat incident without physical contact			
Luring and tricking with verbal communications, following, public indecency, video voyeurism, making sexual gestures, contact from suspicious persons, and peeping	7397 (1477; 5920)	1917 (432; 1485)	Police response to call for police service (2014–2016)

The numbers following the frequencies indicate the frequency for each geocode location; the first numbers indicate the frequency of crimes or incidents geocoded at the city block level, and the second numbers indicate the frequency of crimes or incidents geocoded at the parcel level

victims and offenders, and threat incidents referred to an incident that posed a threat to women or girls, such as molestation. Although not criminally punished, threat incidents are viewed as precursors to sex crimes, and this perspective spearheaded the implementation of countermeasures in Japan (Kikuchi 2015). Eight types of threat incidents were analyzed and divided into those with and those without physical contact (Table 2).

This study used different data sources for sex crimes and threat incidents. Official penal code crime records were used to analyze sex crimes, and, as threat incidents are not covered by the penal code, data on the number of police responses for service requests were analyzed. Thus, this study analyzed sex crimes and threat incidents separately.

The variables for sex crimes and threat incidents were as follows: incident type, incident date/time, location latitude/longitude, geocoding accuracy, and victim's sex/age. We used sex crime and threat incident data on female victims with limited geographically accurate occurrence positions at city block (called *ban*) or parcel (called *go*) levels (Table 2). The geocoding hit rates at these levels were between 94.7% (threat incident with physical contact against girls) and 97.3% (sex crimes against girls).

The frequency of sex crimes and threat incidents varied according to the victim's age. Therefore, data were analyzed separately for women and girls. Girls in this study are those under the age of 13; this bifurcation in age is often used in Japan to distinguish between crimes against children and those against adults.

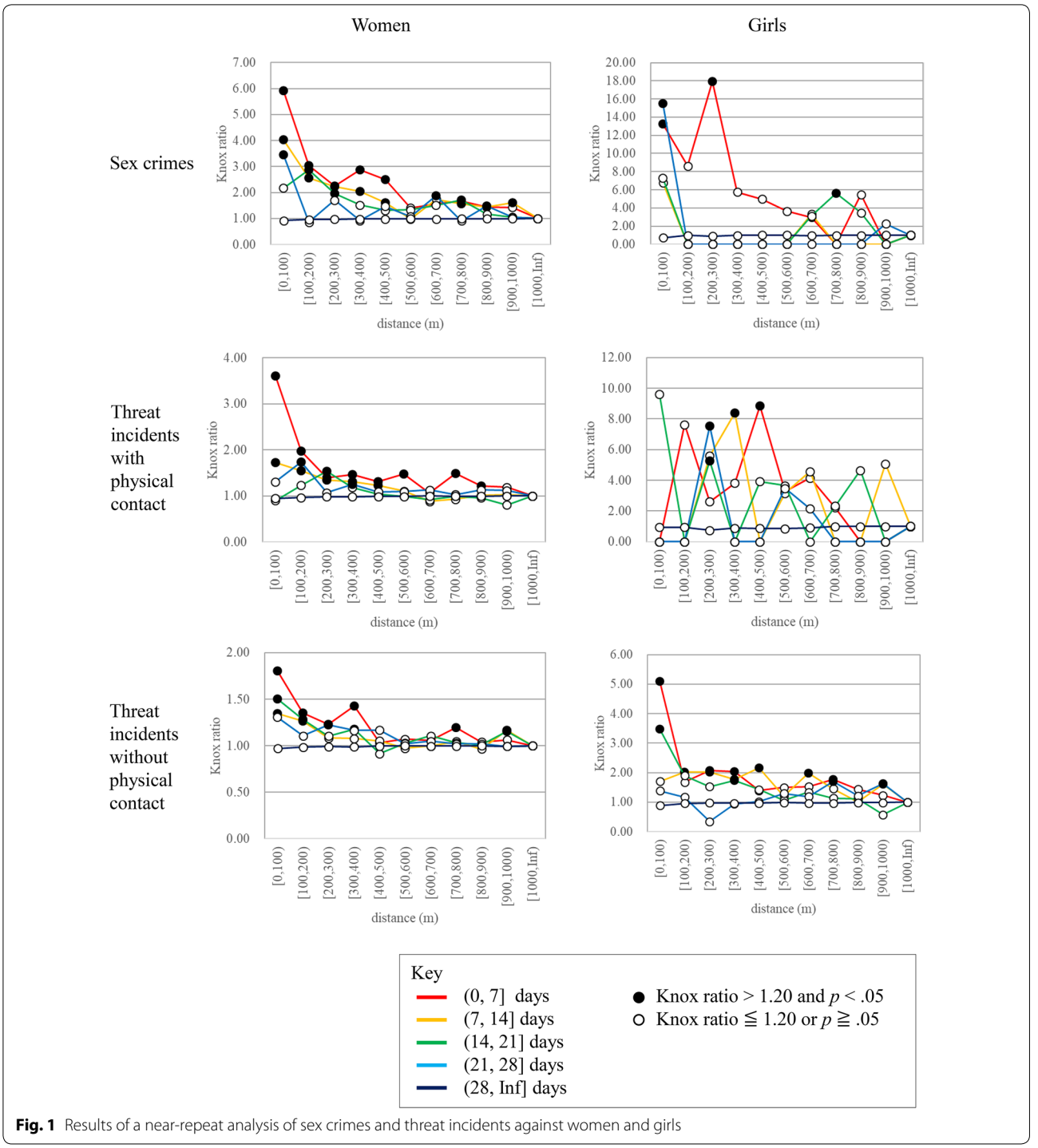

Fig. 1 Results of a near-repeat analysis of sex crimes and threat incidents against women and girls

Analytical methods

"NearRepeat," the R package provided by Steenbeek (2018), was used to analyze the NRV of sex crimes and threat incidents. NearRepeat calculates Knox ratios at specific spatiotemporal ranges from the most recent previous event and their statistical significance using a Monte Carlo simulation. The Knox ratio is an indicator used by Johnson et al. (2007) by improving the spatiotemporal clustering test (Knox test) proposed by Knox (1964). The indicator is calculated by enumerating the occurrences of pairs within a specific time difference and distance difference among the pairs and dividing the value by the expected value on the assumption that each event occurred independently

in time and space. The Knox ratio has generally been used as an indicator of the strength of NRV in previous studies (see Table 1).

Regarding spatiotemporal thresholds to calculate Knox ratios, previous studies mostly used 7 or 14 days and 100 to 150 m as predetermined thresholds considering weekly periodicity of crime occurrence and the average size of city blocks. This study used 7 days as the temporal threshold, as sex-related crimes could be assumed to be periodic within a week. Regarding the spatial threshold, considering the average nearest neighbor distance of the representative point of city blocks in Tokyo's urban area ("Urban Promotion Area" in Tokyo) to be 46.65 m, this study used 100 m, following previous studies.

Results

Figure 1 illustrates the Knox ratio in the predetermined spatiotemporal range with 999 Monte Carlo simulations. NRV can be identified from the magnitude and statistical significance of the value represented in the smallest spatiotemporal range and its decaying pattern with distance and time.

As illustrated in Fig. 1, using Ratcliffe's (2009) criteria of NRV, a Knox ratio larger than 1.20 and p-value less than 0.05, significant NRV was present for sex crimes and two threat incident types less than 100 m and fewer than 7 days from the last crime, with the exception of threat incidents with physical contact against girls. The Knox ratios for all other sex crimes and threat incidents are maximal in an area less than 100 m and time of fewer than 7 days, and they tend to decay from the spatiotemporal range.

Comparing the different sets of data, while referring to the smallest spatiotemporal range, the Knox ratios on sex crimes and threat incidents without physical contact against girls were larger than those against women.

Discussion and conclusion

This study extended the scope of NRV hypotheses to sex crimes and threat incidents against women and girls. As a result, significant near-repeat patterns of sex crimes and two types of threat incidents were identified. This may contribute to the generalization of the NRV hypothesis. Although the NRV of threat incidents with physical contact against girls was not clear, the calculated Knox ratio could become unstable because of the low frequency of incidents.

Additionally, it was revealed that the tendency of NRV was stronger when the victims were girls. This result may be interpreted as being due to the vulnerability of girls, as girls are less likely to access crime-related information than women and have fewer possibilities for actions against crime; consequently, sufficient measures will not be taken after a crime. Therefore, girls are more likely to be repeatedly targeted than women. More generally, it may be hypothesized that NRV is stronger in more vulnerable victims. This hypothesis is indirectly supported by several studies that found that the NRV of some types of property crimes is more likely to occur in vulnerable areas (Lockwood 2012; Zhang et al. 2015; Nobles et al. 2016; Piza and Carter 2018). Future research should develop this topic to generalize the relationship.

Sex-related crimes against women and girls represent an important issue in contemporary Japan because they are not decreasing compared to other crimes (TMPD 2017). As sexual assaults cause serious negative psychological and behavioral consequences for their victims, various measures, including foot patrols by residents and email alerts from the local police, have been introduced in Japan (TMPD 2017). These measures can be evaluated positively as situational crime prevention strategies, which are known to be effective against the NRV of residential burglaries (Grove et al. 2012).

While this research aimed to describe NRV, explaining its overall mechanisms is beyond the scope of this brief report. It is necessary to identify NRV mechanisms regarding sex crimes and threat incidents to strengthen the theoretical foundation further. Additionally, one fundamental problem of sex crimes is that it contains many unreported cases. More accurate estimation of NRV combined with data sources other than police records, such as crime victimization surveys, is a future challenge.

Abbreviations

NRV: Near-repeat victimization; TMPD: Tokyo Metropolitan Police Department.

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Authors' contributions

MA analyzed and interpreted the crime data and wrote the first draft of the manuscript. TN and TS advised on the analysis method and provided a criminological theoretical basis for interpretation. TN and TS also contributed to the manuscript revision. All authors read and approved the final manuscript.

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Availability of data and materials

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Competing interests

The authors declare that they have no competing interests.

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